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Boosting Numeracy Skills Through Multisensory Board Games

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Abstract
This study aims to determine the effectiveness of using a multisensory-based board game model to stimulate early childhood numeracy skills. This study uses a quasi-experimental method research design with a Non-Equivalent Control Group Design approach used in the effectiveness trial in this study. Descriptive and inferential statistical analysis were used to analyze the data in this study. The results of this study show that the effectiveness test shows the results of the N-Gain analysis there is an increase in the average value of children's numeracy skills in the experimental group with a value of 0.81 or equivalent to 80.98% in the high category, while the control group with a value of 0.59 or equivalent to 59.15% in the medium category. Furthermore, the results of the Independent Sample T-Test difference test showed a significant difference between the average posttest scores in the control group and the experimental group. This is based on the calculated t value of 13.347 which exceeds the t table value, with a significance level of $p < 0.05$ ($p = 0.000$). Thus, the effectiveness test states that the use of multisensory-based board game media is effective in stimulating the numeracy skills of early childhood children.
Keywords: numeracy; media; multisensory; boardgame

Introduction
Children who are proficient in the use of numbers, symbols, geometry, measurement, patterns, spatial reasoning, and quantitative information formats like graphs, tables, and charts are highly valued for having numeracy literacy skills (Kemdikbud, 2021). Adaptive abilities as well as literacy and numeracy skills are certainly not immediately acquired by children, or even adults. Special stimulation is needed for children's literacy and numeracy skills to develop well. As a requirement for life skills in the 21st century, a numeracy literacy culture can be achieved through integrated education starting from family, school, and community. As an effort to improve literacy, the Government of the Republic of Indonesia launched the National Literacy Movement, which began with the issuance of the Minister of Education and Culture Regulation number 23 of 2015 concerning character building, which became the basis for the Ministry of Education and Culture to organize illiteracy eradication programs with literacy movements.

Ekowati et al., (2019) declare that numeracy The capacity for reasoning is known as literacy. The future growth of the Indonesian country greatly depends on the early acquisition of numeracy literacy abilities. Kline, (1973) states that a country's progress can be developed through understanding in the mathematical field. Therefore, the Trends in International Mathematics and Science Study (TIMSS) explains the importance of numeracy literacy stimulation being applied in Early Childhood Education to support children's numeracy literacy skills to higher levels of education, both at the Elementary School and Secondary School levels. Numeracy literacy can be carried out at home, at school, and even in the community environment, adapted to existing environmental conditions and potentials.

The reality in the field found that children aged 5-6 years have not been invited to play much in stimulating numeracy by their teachers. This is based on the results of observations related to numeracy skills in 15 children showing that 8 children still lack mastery of several numeracy skills. Children's numeracy skills are still low in the use of numbers, recognition of geometric shapes and space, problem solving and grouping objects, resulting in children having difficulty in finding problem-solving solutions in completing activities related to numeracy skills.

Based on the results of interviews conducted by researchers with 3 teachers in Rote Ndao Regency, it can be identified that in general they still use group learning. Teachers have not used or created fun learning to stimulate children's numeracy. The teacher explained that learning only uses Children's Activity Sheets (LKA) so that activities lack variation in stimulating children's numeracy skills. In addition, the results of observations show that teachers lack insight into the importance of developing numeracy skills that children must have in this modern era. This has an impact on the lack of learning innovation and lack of use of media as a learning resource. So that children tend to experience boredom in every learning because learning is less interesting and not fun.

The educational prosperity theory states that success in education results from each stage of development, while success in each stage is an accumulation of success in the previous stage (Kemendikbud, 2019). Early childhood education lays the groundwork for the development of numeracy skills, which will continue to grow quickly in the future. This reality strengthens the idea of the importance of improving numeracy skills in early childhood. Concrete items as learning medium and game innovations in the learning process are two ways to stimulate numeracy skills in young children. This numeracy skills stimulus can be done through visual processes that involve hand-eye coordination on symbols that encourage attention to the regularity of sequences (RK & Watini, 2022). Early childhood education, according to Piaget, is still in the pre-concrete operational stage, which calls for tangible materials that can be seen, felt, touched, and even smelled. Educators can involve all the potential of children's senses so that efforts to develop numeracy literacy skills can be achieved maximally.

The process of involving the senses in stimulating early childhood numeracy skills is inseparable from educators' strategies in innovating using learning facilities. Therefore, learning innovations that can stimulate numeracy skills are the multisensory-based board game model. Susanti et al., (2021) explain that learning innovations can be designed by teachers according to the needs of early childhood, environmental conditions, local potential, and cultural wisdom in each institution or region where children learn. The multisensory-based board game model is based on learning styles that utilize all the potential of children's senses. Maryanti et al., (2021) state that board games are games played on a flat area with established rules, and players must pass through a certain route to complete the missions set in the game theme.

Multisensory-based board games are a development of monopoly and snakes and ladders games combined with multisensory apparatus. This multisensory-based board game consists of a winding circular pawn board, dice as a determinant of game steps, player representative pawns, find and explore cards as instructions for game missions, a set of multisensory apparatus that

must be carried out in game missions, and reward pieces if they have completed the mission correctly. The application of the multisensory-based board game model can provide opportunities to apply different learning styles to each child to gain real and contextual experiences that can be tailored to the theme to be introduced to children. Abidin, (2018) explains that in practice, multisensory learning transforms abstract knowledge into concrete knowledge. Therefore, the multisensory-based board game model is very effective for application to early childhood (Baines, 2008).

The researcher developed a novel game model based on the previously mentioned background, which will be evaluated in a study named Boosting Numeracy Skills with Multisensory Board Games.This study is expected to be beneficial in improving the numeracy literacy skills of early childhood in early childhood education units (PAUD).

Literature Review

Strategies to improve numeracy literacy skills need to be carried out by involving all members of the school, family, and community environment. There are many methods that can be used to improve numeracy literacy to meet various socio-cultural needs and conditions. Han et al., (2017) mentions that there are several strategies to improve numeracy literacy: (1) improving facilitators; (2) increasing the quantity and quality of learning resources; (3) increasing public engagement and access to high-quality learning resources; and (4) improving governance. Strengthening facilitators is intended to enable them to use learning models, methods, and media to introduce numeracy literacy to children. Increasing the quantity of high-quality learning resources that are tailored to existing environmental conditions and potentials.

Numeracy literacy can be said to be the ability to calculate with critical thinking in completing daily tasks that must be possessed in the 21st century. Literacy and numeracy are two different but aligned skills; numeracy skills correlate with literacy skills. The Organization for Economic Cooperation and Development (OECD) claims that mathematical reasoning is a crucial aspect of numeracy literacy and that it goes beyond simply discussing how mathematics may be applied to address problems in the actual world. The PISA 2021 framework shows that mathematical reasoning is essential for the problem-solving cycle and overall numeracy literacy. Therefore, mathematical literacy consists of two related aspects: mathematical reasoning and problem-solving. As prerequisites for knowledge and abilities closely related to comprehending numbers, symbols, and evaluating quantitative data in the form of graphs, tables, charts, and other visual aids, numeracy literacy skills are crucial to teach children so they can attempt to apply fundamental mathematical ideas in the real world (Mulyati & Watini, 2022).

Preparation for higher education is greatly aided by early childhood education. Therefore, in this period, it is important to introduce numeracy literacy early to children to prepare them in understanding the introduction of numbers, symbols, and graphs that will be the basis for their education in the future. The Organization for Economic Co-operation and Development, (2001) explains the importance of early childhood education as a starting strong

in stimulating numeracy literacy skills with a community culture through the role of families, schools, and governments as a future investment in preparing children's numeracy skills to enter further education. In numeracy literacy learning, learning resources are not only books but also all multimodal aspects in the surrounding environment that can generate active interaction between students and the public. Strengthening governance in terms of funding and facilities to support educators in stimulating numeracy literacy. Numeracy literacy encompasses ideas, information, methods, and instruments for characterizing, elucidating, and forecasting phenomena (OECD, 2018).

Learning is a process that everyone goes through to improve themselves for the better in the future(Amsari & Mudjiran, 2018). Teachers must deeply understand students in terms of the development of children's abilities and children's learning styles. Behaviorism learning theory focuses on measurable end results, because measurement is very important to know if there are changes in behavior (Shofiyani et al., 2022). Behaviorist theorists emphasize that behavioral changes actually occur not only in a person's structuralization; behaviorists tend to emphasize their relevance to human behavior in real situations. Through play, children express and expand their understanding of previous experiences with newly acquired experiences (Perkins & Taylor, 2018). Fadillah, (2017) mentions that playing is an effort to achieve joy and satisfaction from every activity carried out, both using playing equipment and without playing equipment.

Play-based learning is learning through the use of play in the classroom (Peaslee, 2022). From a psychological perspective, the entertainment characteristics in play-based learning can arouse students' motives and increase engagement. Games can make students learn more actively(Hsu & Chen, 2022). Based on the current situation of students' knowledge and awareness, game content can be adapted to students' knowledge, experiences, and skills. Play-based learning gives students opportunities to practice cooperation and teamwork while fostering the development of learning skill regulation (Taylor & Boyer, 2019). Khalil et al., (2022) mention that games in a learning environment lead to the goal of obtaining learning benefits guided by educators, in this case, children can be directly involved, think, understand rules, and have fun.

In the context of education and learning, board games can be defined as more than just strategy games in which players move pieces over a board (Rajkovic et al., 2019). Mufida, (2021) explains that board games are played on a board using pawns and following the rules contained in the layout of the images on the board; sometimes, some board games also involve the use of other objects to play. Board game media can be applied to educational activities to enhance students' skills, increase student social interaction, and make learning activities interesting and educational (Mahyuddin et al., 2022).

Multisensory learning allows a combination of multimodal aspects, both visual, auditory, and kinesthetic, to become a diversity of learning experiences (Santhian & Ramachadran, V, 2020). Meier, (2000) argues that multisensory potential, including thinking (intellectual), hearing (auditory), seeing (visual), and physical activity/movement (somatic), can

be involved and utilized as much as possible according to the potential that children have in learning can help them achieve learning goals. The multisensory-based board game model is a series of learning that contains systematic steps in educational games aimed at achieving learning goals by utilizing all forms of senses, both sight (visual), hearing (auditory), movement (kinesthetic), and touch (tactile).

The multisensory-based board game model relies on learning styles that utilize all the potential of children's senses. Multisensory-based board games are a development of monopoly games combined with multisensory apparatus. This multisensory-based board game consists of a winding circular pawn board, dice as a determinant of game steps, player representative pawns, find and explore cards as instructions for game missions, a set of multisensory apparatus that must be carried out in game missions, and reward pieces if they have completed the mission correctly. The application of the multisensory-based board game model can provide opportunities for the application of different learning styles to each child to gain real and contextual experiences that can be tailored to the theme to be introduced to children.

Methods

This study tested the effectiveness of the Implementation of a multisensory-based board game model with a quasi-experimental method with a Non-Equivalent Control Group Design approach used in the effectiveness trial in this study. The trial was conducted at TK Kristen Touiu involving 13 children aged 5-6 years as a control class and TK Paulus Busalangga involving 15 children aged 5-6 years as an experimental class.

The effectiveness of the data was obtained from the results of the work indication of numeracy skills. After the data was collected, the data would be analyzed using descriptive and inferential statistical methods. Descriptive statistical analysis used the N-Gain Score Test. The N-Gain Score Test was used to measure the difference between the pretest and posttest scores in the experimental group and the control group in this study. Inferential statistics were used to conduct comparative hypothesis testing between the experimental group and the control group. In this study, data normality testing was carried out on the pretest and posttest of the control group and the experimental group in numeracy literacy skills. In terms of testing data normality with a small number of samples, the Shapiro-Wilk test was used. and then a homogeneity test was carried out by looking at the Sig. Levene value. The homogeneity test is not absolute, but it can affect the way we read the results of further analysis.

Finally, this study used a Non-Equivalent Control Group Design with subjects in the experimental group and the control group not selected randomly. In this study, hypothesis testing used the T-Test to test the differences between the two groups. Testing was carried out using the Independent Sample T-Test to calculate the difference between the pretest and posttest in the control group and the experimental group. The Independent Sample T-Test is used to compare two different samples.

Result

The implementation of multisensory-based board game media in the field was carried out by providing treatment to children aged 5-6 years using a multisensory-based board game product to stimulate children's numeracy skills. Trials were conducted to see the results before and after receiving treatment with the multisensory-based board game media product. The tests were conducted in three schools, namely TK Kristen Touiu involving 13 children aged 5-6 years as the control class. And TK Paulus Busalangga involving 15 children aged 5-6 years as the experimental class. The following is documentation of the results of implementing learning with multisensory-based board game media:

Figure 1. Implementation of Learning with Multisensory-Based Board Game Media

The trials were implemented in accordance with the planned learning implementation strategy. Learning with multisensory-based board game media was carried out in three meetings per week in the experimental and control classes. Learning began with preparation, core activities, and closing. In the preparation session, educators conditioned the children and explained the activities and game rules that would be carried out. The implementation of core activities was carried out by determining playing turns, demonstrations in playing multisensory-based board game media, and calculating the rewards obtained after playing. Children's numeracy skills and activities were evaluated as part of the ending section.In the initial stage, a pretest was conducted on the control class to see children's initial numeracy skills. Furthermore, learning in the control class was carried out as usual using picture media and LKA. A posttest was administered at the conclusion of the learning activities to gauge the progress of the kids' numeracy abilities. The second stage, a pretest was conducted on the experimental group to determine children's initial numeracy skills. Learning in the experimental class was carried out using multisensory-based board game media. An assessment (posttest) was carried out after learning activities with question and answer methods and performance by children and teachers. The following are the results of descriptive and inferential analysis in this study:

A. Results of Descriptive Statistical Analysis

The data from the descriptive analysis in the research on the use of a multisensory-based board game model to stimulate children's numeracy skills aims to determine the overview of the research results. The data obtained are in the form of pretest and posttest results, as well as a recapitulation of the results of the improvement of children's numeracy skills that have been carried out in the field.

1. Results of Children's Initial Numeracy Skills (Pretest)

Prior to the usage of media in the classroom, information on the basic numeracy abilities of children ages 5 to 6 was gathered. Initial skills (pretest) were derived from observations made by the teacher during the learning implementation process, which involved question-and-answer sessions and student performance. The difference between the children's abilities in the experimental class and the control class is determined by the results of the initial skills test (pretest). The following is a summary of the data regarding the outcomes of the children's initial skills:

Table 1. Recapitulation of Initial Numeracy Skills Results (Pretest)

Aspect	No. Item	Control (N=13)		Experiment (N=15)	
		Average	%	Average	%
Number	1	26	50 %	30	50 %
Geometry and measurement	2	20	38,46 %	27	45 %
	3	26	50 %	27	45 %
	4	24	46,15 %	25	41,67 %
	5	19	36,54 %	23	38,33 %
	6	22	42,31 %	30	50 %
	7	25	48,08 %	28	46,67 %
Algebra	8	25	48,08 %	23	38,33 %
	9	24	46,15 %	26	43,33 %
Grouping and estimation	10	24	46,15 %	27	45 %
	11	24	46,15 %	29	48,33 %
	12	24	46,15 %	28	46,67 %
	13	21	40,38 %	28	46,67 %
	14	19	36,54 %	22	36,67 %
Pretest Average		**23,07**	**44,37 %**	**26,64**	**44,40 %**

According to the results of the pretest data recapitulation, the experimental group scored 26.64, or 44.40%, whereas the control group scored 23.07, or 44.37%. It can be concluded that the average pretest scores in both groups were not significantly different in the numeracy abilities of children.

2. Results of Children's Final Numeracy Skills (Posttest)

After accessing the media, children aged 5 to 6 demonstrated changes in their final numeracy skills compared to the original data collected earlier. Following the use of various media in the learning implementation, the posttest, which is the final data on

children's numeracy skills, attempts to determine how the abilities of the experimental and control classes differ. The results of numeracy skills in the experimental class were carried out using multisensory-based board game media, while in the control class, learning was carried out as usual, namely using picture media and LKA. The recapitulation of the final data on children's numeracy skills (posttest) that has been obtained can be seen as follows:

Table 2. Recapitulation of Final Numeracy Skills Results (Posttest)

Aspect	No. Item	Control (N=13)		Experiment (N=15)	
		Average	%	Average	%
Number	1	45	86,54 %	59	98,33 %
Geometry and measurement	2	40	76,92 %	55	91,67 %
	3	42	80,77 %	53	88,33 %
	4	40	76,92 %	53	88,33 %
	5	41	78,85 %	51	85 %
	6	39	75 %	58	96,67 %
	7	40	76,92 %	51	85 %
Algebra	8	38	73,08 %	53	88,33 %
	9	40	76,92 %	55	91,67 %
Grouping and estimation	10	38	73,08 %	52	86,67 %
	11	39	75 %	56	93,33 %
	12	42	80,77 %	54	90 %
	13	41	78,85 %	52	86,67 %
	14	38	73,08 %	50	83,33 %
Posttest Average		**40,21**	**77,34 %**	**53,71**	**89,52 %**

The recapitulation data show that the experimental group's posttest score was 53.71, or 89.52%, while the control group's score was 40.21, or 77.34%. It is possible to draw the conclusion that both classes' posttest results increased. When the experimental group used the multisensory-based board game model, they were able to get a higher posttest score than the control group.

3. Results of Increased Children's Numeracy Skills

N-Gain calculations were used to further assess the pretest and posttest findings of the experimental group's and control group's children's numeracy skills. The following table displays a summary of the N-Gain results:

Table 3. N-Gain Score Results

Control Group			Experiment Group		
Child Code	N-Gain (N=13)	Percentage	Kode Anak	N-Gain (N=15)	Percentage
APL	0,57	57,14 %	GK	0,80	80,00 %
KEN	0,59	58,62 %	YNU	0,75	75,00 %
GM	0,56	56,25 %	AT	0,90	90,32 %

GDH	0,62	61,76 %	RT	0,82	82,35 %
HN	0,55	55,17 %	TH	0,84	84,38 %
LS	0,58	58,06 %	RNU	0,79	78,57 %
BM	0,59	59,26 %	AAB	0,83	82,76 %
RM	0,56	56,25 %	GL	0,77	77,42 %
VC	0,64	63,89 %	CL	0,89	88,57 %
NCS	0,61	60,61 %	AAD	0,81	80,65 %
FDH	0,59	58,82 %	DA	0,91	90,91 %
RM	0,65	64,52 %	DN	0,81	81,25 %
YFT	0,59	58,62 %	KL	0,74	74,19 %
			MH	0,73	73,33 %
			JAM	0,75	75,00 %
Minimum	**0,55**	**55,17 %**	**Minimum**	**0,73**	**73,33** %
Maximum	**0,65**	**64,52 %**	**Maximum**	**0,91**	**90,91** %
Average	**0,59**	**59,15 %**	**Average**	**0,81**	**80,98** %

According to the results of the N-Gain analysis, the control group had an average numeracy skill score of 0.59, which corresponds to 59.15%, indicating that the numeracy skills of 5-6-year-old children in this group fall within the medium category. In contrast, the experimental group scored 0.81, or 80.98%, meaning the numeracy skills of 5-6-year-old children in this group are categorized as high. The recapitulation data reveals a difference in numeracy skills between the experimental and control groups. The conclusion drawn from the N-Gain analysis is that the average score in the experimental group, which used multisensory-based board games for learning, showed a greater improvement in children's abilities compared to the control group, which employed picture media to stimulate numeracy skills in 5-6-year-old children.

B. Results of Inferential Statistical Analysis

The data results from the inferential statistical analysis in this study are used to see the effectiveness of numeracy skills in children aged 5-6 years in the control class and the experimental class regarding the use of multisensory-based board game media. The data obtained are then analyzed using statistical calculations, namely the Independent Sample T-test. Before conducting the analysis, prerequisite tests are carried out with normality tests and homogeneity tests.

1. Results of Normality Test

The first prerequisite test is conducted with a normality test to determine whether the data follows a normal distribution, which is an essential step in assessing the distribution of the collected data. In this study, the normality test is performed using the Shapiro-Wilk test, as it is suitable for small sample sizes. The data from the pretest and posttest results of both the control and experimental groups are then organized in Microsoft Excel and analyzed using SPSS version 22. The decision-making process follows these criteria: if the p-value is greater than 0.05, H0 is accepted and H1 is

rejected; if the p-value is less than 0.05, H0 is rejected and H1 is accepted. The hypothesis for the normality test is as follows:
H0: Data is normally distributed
H1: Data is not normally distributed

Table 4. Normality Test Results

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelompok	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	Kelompok Eksperimen	.140	15	.200*	.962	15	.722
	Kelompok Kontrol	.174	13	.200*	.964	13	.818
Posttest	Kelompok Eksperimen	.199	15	.113	.914	15	.155
	Kelompok Kontrol	.233	13	.053	.888	13	.093

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the results of the normality test, the pretest and posttest values for both the control and experimental groups are 0.722, 0.818, 0.155, and 0.093. Since these p-values are greater than 0.05, H0 is accepted, and H1 is rejected. Therefore, it can be concluded that the significance values from the Shapiro-Wilk test indicate that the data is normally distributed.

2. Homogeneity Test Results

The data that has been tested for normality is then continued with a homogeneity test. If the normality test is an absolute prerequisite test, then the homogeneity test is a non-absolute prerequisite test. The homogeneity test aims to determine whether the data distribution in the control group and the experimental group comes from populations with the same variance. The data obtained is then analyzed using SPSS version 22.0 to see the Sig. Levene value. The assumptions for the homogeneity test are as follows:

H0: Data is homogeneous
H1: Data is not homogeneous

Table 5. Homogeneity Test Results

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Pretest	Based on Mean	1.741	1	26	.198
	Based on Median	1.730	1	26	.200
	Based on Median and with adjusted df	1.730	1	25.649	.200
	Based on trimmed mean	1.747	1	26	.198
Posttest	Based on Mean	1.635	1	26	.212
	Based on Median	1.480	1	26	.235
	Based on Median and with adjusted df	1.480	1	22.890	.236
	Based on trimmed mean	1.512	1	26	.230

Based on the results of the homogeneity test, the pretest scores for both the control and experimental groups showed a Levene's test p-value greater than 0.05, meaning H0 is accepted and H1 is rejected, indicating that the data distribution is homogeneous. However, the posttest scores for the control and experimental groups showed a p-value less than 0.05, meaning H0 is rejected and H1 is accepted, indicating that the data is not homogeneous. As mentioned earlier, since the homogeneity test is not an absolute prerequisite, the research can still proceed even though the data is not homogeneous. However, this may affect the interpretation of the results in the Independent Sample T-Test.

The homogeneity test results can also identify outlier data. The prerequisite hypothesis test also looks at the data distribution to ensure there are no outlier data, as follows:

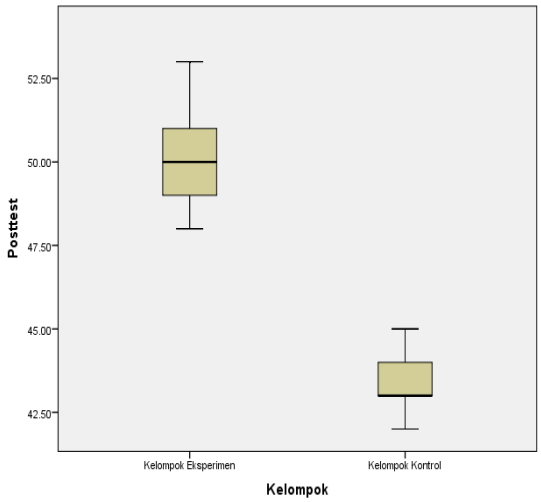

Figure 2. Boxplot Output Results of Outlier Data Distribution

The boxplot of the outlier data distribution demonstrated that there were no isolated data points; therefore, the posttest data set does not contain outliers and is valid for hypothesis testing.

3. Hypothesis Test Results

After ensuring that the data from both the control and experimental groups have passed the normality and homogeneity tests, the next step is to conduct a hypothesis test to evaluate the effectiveness of the product. This involves comparing the differences between the control group and the experimental group using the Independent Sample T-Test. The hypotheses for this difference test are outlined as follows:

H0: There is no significant difference in the average scores of children's numeracy skills using the multisensory-based board game model and children not using the multisensory-based board game model.

H1: There is a significant difference in the average scores of children's numeracy skills using the multisensory-based board game model and children not using the multisensory-based board game model.

The decision-making criteria for the Independent Sample T-Test are as follows: if the significance (Sig) value is greater than 0.05, H0 is accepted and H1 is rejected, indicating no significant difference between the control and experimental groups. Conversely, if the Sig value is less than 0.05, H0 is rejected and H1 is accepted, indicating a significant difference between the two groups. The following are the results of the Independent Sample T-Test.

Table 6. Independent T-Test Results

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Pretest	Equal variances assumed	1.741	.198	.023	26	.982	.02051	.88377	-1.79610	1.83713
	Equal variances not assumed			.023	21.996	.982	.02051	.90261	-1.85141	1.89243
Posttest	Equal variances assumed	1.635	.212	12.924	26	.000	6.82564	.52812	5.74008	7.91121
	Equal variances not assumed			13.347	23.879	.000	6.82564	.51141	5.76987	7.88141

Based on the results of the Independent Sample T-Test as a hypothesis test, an analysis of the Sig. (2-tailed) value indicates that in the Equal variances assumed row, the Sig. value is 0.982. Since this value exceeds the predetermined significance level of 0.05, the null hypothesis (H0) is accepted, and the alternative hypothesis (H1) is rejected. This suggests that there is no significant difference in the pretest average scores between the control and experimental groups. However, when examining the posttest scores in the Equal variances not assumed row, it is evident that the data is not homogeneous. The obtained p-value of 0.000, which can be expressed as 0.05×10^{-3}, is smaller than the significance threshold of 0.05. Consequently, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted. Thus, the hypothesis testing results indicate a significant difference in the average numeracy skill scores of children, demonstrating the impact of the multisensory-based board game model in enhancing numeracy skills.

Based on the results of the N-Gain analysis, there is a difference in the average numeracy skill scores between the experimental and control groups. The experimental group achieved a score of 0.81, or 80.98%, which falls into the high category, while the control group obtained a score of 0.59, or 59.15%, placing it in the medium category. Additionally, the results of the independent sample t-test indicate that $p < 0.05$ and t-calculated > t-table, with t-calculated = 13.347 and a significance level of $p = 0.000$. This confirms a significant difference in the posttest average scores between the control and experimental groups. Therefore, it can be concluded that the use of multisensory-based board game media is highly effective in significantly enhancing children's numeracy skills.

Discussions

The foundation for numeracy skills is best established from a young age to foster kids' knowledge of basic aptitude for mathematics so that they develop rapidly. Numeracy skills are also beneficial for helping to solve daily problems in life (Wahyuni, 2022). Therefore, the development of an early foundation must be supported (Niklas & Tayler, 2017). Efforts to support numeracy skills from an early age are carried out by creating learning and providing learning resources that are appropriate for children's ages. Learning is done by providing stimulation to children to generate appropriate responses according to the expected goals(Sani, 2013).

Based on the idea that learning in early childhood has its own uniqueness, learning must be done comprehensively, continuously, freely, enjoyably, and possess the capacity to adjust to higher levels, which could enhance life quality (Lestariningrum et al., 2021). In this study, an innovation in learning using a multisensory-based board game model was carried out, which aims to stimulate children's numeracy skills. This learning innovation refers to concepts, ideas, or actions that are new in the learning domain, which are considered as new solutions to overcome problems in the learning process (Maswati et al., 2023). The use of learning innovation is also based on concerns and various problems encountered in early childhood education institutions. The multisensory-based board game model was created with the

assumption that children can learn with various multimodal aspects they possess, such as hearing, sight, movement, and touch, through interesting and enjoyable board games. Overall, sensory stimulation that integrates all sensory modalities (multisensory) has been shown to increase children's engagement in the learning process, improve their abilities and potential to learn, improve brain function, cultivate positive attitudes, and enhance taught skills (Ruhaena, 2015).

Based on the characteristics of board game media, it can be seen that the common thread in the use of this product is that this learning innovation aims to stimulate the development of children's numeracy skills by utilizing children's multimodality through interesting and fun games, and in accordance with the child's age development stage. The multisensory-based board game model can be played together with children which can create active interaction in children. This opinion is in line with Yuliantina's statement, (2023) which states that through playing children can learn to interact with peers and adults using various forms of symbolic communication, such as listening, taking turns, expressing themselves through body movements, sounds, speech, words, pictures or printed words, and various other forms of work.

Conclusion

Multisensory-based board diversion media, which combines board amusement components with multisensory incitement. This diversion is outlined to progress the numeracy proficiency aptitudes of early childhood and create an understanding of fundamental scientific concepts through fun recreations that include different faculties of children, such as locate, hearing, touch, and development. This think about includes a control bunch and an test gather to compare the contrasts between the two bunches. The quasi-experiment strategy with the Non-Equivalent Control Gather Design approach was utilized within the adequacy trial in this think about. Clear and inferential measurable investigation was utilized to analyze the information in this consider. The viability test appeared the comes about of the N-Gain investigation, there was an increment within the normal esteem of children's numeracy aptitudes within the test bunch with a esteem of 0.81 or identical to 80.98% within the tall category, whereas the control bunch with a esteem of 0.59 or comparable to 59.15% within the medium category. Besides, the comes about of the Free Test T-Test distinction test appeared a noteworthy distinction between the normal posttest scores within the control gather and the experimental gather. This can be based on the calculated t-value of 13.347 which surpasses the t-table esteem, with a importance level of $p < 0.05$ ($p = 0.000$). In this way, the viability test expressed that the utilize of multisensory-based board recreations was compelling in fortifying the numeracy abilities of early childhood. Multisensory-based board recreations are successfully utilized in learning by giving genuine learning encounters through dynamic child interaction, in this manner making strides problem-solving aptitudes and numerical thinking in children's numeracy learning. In the future, educators can utilize multisensory-based board game media as a learning resource to stimulate early childhood numeracy skills in an interesting and enjoyable way.

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